Frequency (MHz)	Frequency Tolerance (percent)		
	All fixed and base stations	Mobile stations over 3 watts	Mobile stations 3 watts or less
29,100 to 29,250	0.001	.....	.....
31,000 to 31,075 [8] ...	0.001	.....	.....
31,075 to 31,225 [8] ...	0.001	.....	.....
31,225 to 31,300 [8] ...	0.001	.....	.....
31,300 to 40,000 [6] ...	0.03	.....	.....

[1] Applicable only to common carrier LTTS stations. Beginning Aug. 9, 1975, this tolerance will govern the marketing of LTTS equipment and the issuance of all such authorizations for new radio equipment. Until that date new equipment may be authorized with a frequency tolerance of .03 percent in the frequency range 2,200 to 10,500 MHz and .05 percent in the range 10,500 MHz to 12,200 MHz, and equipment so authorized may continue to be used for its life provided that it does not cause interference to the operation of any other licensee.

[2] Equipment authorized to be operated on frequencies between 890 and 940 MHz as of Oct. 15, 1956, must maintain a frequency tolerance within 0.03 percent subject to the condition that no harmful interference is caused to any other radio station.

[3] See subpart G of this part for the stability requirements for transmitters used in the Digital Electronic Message Service.

[4] Existing type accepted equipment with a frequency tolerance of ±0.03% may be marketed until December 1, 1988. Equipment installed and operated prior to December 1, 1988 may continue to operate after that date with a minimum frequency tolerance of ±0.03%. However, the replacement of equipment requires that the ±0.003% tolerance be met.

[5] For remote stations with 12.5 KHz bandwidth, the tolerance is ±0.00015%.

[6] Applicable to private operational fixed point-to-point microwave only. For exceptions see § 101.147.

[7] For private operational fixed point-to-point microwave systems, with a channel greater than or equal to 50 KHz bandwidth, ±0.0005%; for multiple address master stations, regardless of bandwidth, ±0.00015%; for multiple address remote stations with 12.5 KHz bandwidths, ±0.00015%; for multiple address remote stations with channels greater than 12.5 KHz bandwidth, ±0.0005%.

[8] For stations authorized prior to March 11, 1997, transmitter frequency tolerance shall not exceed 0.03 percent.

(b) Heterodyne microwave radio systems may be authorized at a somewhat less restrictive frequency tolerance (up to .01 percent) to compensate for frequency shift caused by numerous repeaters between base band signal insertion. Where such relaxation is sought, applicant must provide all calculations and indicate the desired tolerance over each path. In such instances the radio transmitters and receivers used must individually be capable of complying with the tolerance specified in paragraph (a) of this section. Heterodyne operation is restricted to channel bandwidth of 10 MHz or greater.

(c) As an additional requirement in any band where the Commission makes assignments according to a specified channel plan, provisions must be made to prevent the emission included within the occupied bandwidth from radiating outside the assigned channel at a level greater than that specified in § 101.111.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23167, Apr. 29, 1997]

§ 101.109 Bandwidth.

(a) Each authorization issued pursuant to these rules will show, as the emission designator, a symbol representing the class of emission which must be prefixed by a number specifying the necessary bandwidth. This figure does not necessarily indicate the bandwidth actually occupied by the emission at any instant. In those cases where part 2 of this chapter does not provide a formula for the computation of the necessary bandwidth, the occupied bandwidth may be used in the emission designator.

(b) Stations in this service will be authorized any type of emission, method of modulation, and transmission characteristic, consistent with efficient use of the spectrum and good engineering practice, except that Type B, damped-wave emission will not be authorized.

(c) The maximum bandwidth which will be authorized per frequency assigned is set out in the table that follows. Regardless of the maximum authorized bandwidth specified for each frequency band, the Commission reserves the right to issue a license for less than the maximum bandwidth if it appears that a lesser bandwidth would be sufficient to support an applicant's intended communications.

Frequency band (MHz)	Maximum authorized bandwidth
928 to 929	25 KHz [1, 6]
932 to 932.5, 941 to 941.5	12.5 KHz [1]
932.5 to 935, 941.5 to 944	200 KHz [1]
952 to 960	200 KHz [1, 5]
1,850 to 1,990	10 MHz [1]
2,110 to 2,130	3.5 MHz
2,130 to 2,150	800 or 1600 KHz [1]
2,150 to 2,160	10 MHz
2,160 to 2,180	3.5 MHz
2,180 to 2,200	800 or 1600 KHz [1]
2,450 to 2,483.5	625 KHz [2]
2,483.5 to 2,500	800 KHz
3,700 to 4,200	20 MHz
5,925 to 6,425	30 MHz [1]
6,425 to 6,525	25 MHz
6,525 to 6,875	10 MHz [1]
10,550 to 10,680	5 MHz [1]
10,700 to 11,700	40 MHz [1]
12,200 to 12,700	20 MHz [1]
13,200 to 13,250	25 MHz
17,700 to 18,140	220 MHz [1]
18,140 to 18,142	2 MHz
18,142 to 18,580	6 MHz

Frequency band (MHz)	Maximum authorized bandwidth
18,580 to 18,820	20 MHz [1]
18,820 to 18,920	10 MHz
18,920 to 19,160	20 MHz [1]
19,160 to 19,260	10 MHz
19,260 to 19,700	220 MHz [1]
21,200 to 23,600	100 MHz [4]
24,250 to 25,250	40 MHz
27,500 to 28,350	850 MHz
29,100 to 29,250	150 MHz
31,000 to 31,075	75 MHz
31,075 to 31,225	150 MHz
31,225 to 31,300	75 MHz
38,600 to 40,000	50 MHz Bands above 40,000 [3]

[1] The maximum bandwidth that will be authorized for each particular frequency in this band is detailed in the appropriate frequency table in § 101.147.
[2] 1250 KHz, 1875 KHz, or 2500 KHz on a case-by-case basis.
[3] To be specified in authorization.
[4] For exceptions, see § 101.147(t).
[5] A 12.5 KHz bandwidth applies only to frequencies listed in § 101.147(b)(1).
[6] For frequencies listed in § 101.147(b)(1), consideration will be given on a case-by-case basis to authorizing bandwidths up to 50 KHz.

[61 FR 26677, May 28, 1996, as amended at 61 FR 44181, Aug. 28, 1996; 62 FR 23167, Apr. 29, 1997; 62 FR 24582, May 6, 1997]

§ 101.111 Emission limitations.

(a) The mean power of emissions must be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(1) When using transmissions other than those employing digital modulation techniques:

(i) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 decibels;

(ii) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 decibels;

(iii) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43+10\ \mathrm{Log}_{10}$ (mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation.

(2) When using transmissions employing digital modulation techniques (see § 101.141(b)) in situations not covered in this section:

(i) For operating frequencies below 15 GHz, in any 4 KHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:

$$A = 35 + 0.8(P - 50) + 10\ \mathrm{Log}_{10}\ B.$$ (Attenuation greater than 80 decibels is not required.)

where:

A = Attenuation (in decibels) below the mean output power level.
P = Percent removed from the carrier frequency.
B = Authorized bandwidth in MHz.

(ii) For operating frequencies above 15 GHz, in any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 11 decibels:

$$A = 11 + 0.4(P - 50) + 10\ \mathrm{Log}_{10}\ B.$$ (Attenuation greater than 56 decibels is not required.)

(iii) In any 4 KHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43+10\ \mathrm{Log}_{10}$ (mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation.

(3) For Digital Termination System channels used in the Digital Electronic Message Service (DEMS) operating in the 10,550–10,680 MHz band:

(i) In any 4 KHz band, the center frequency of which is removed from the edge of the DEMS channel by up to and including 1.125 times the DEMS subchannel bandwidth: As specified by the following equation may in no event be less than $50+10\ \log_{10}$ N decibels:

$$A = 50 + 0.0333(F - 0.5B) + 10\ \log_{10}\ N \text{ decibels}$$

Where:

A = Attenuation (in decibels) below means output power level contained within the DEMS channel for a given polarization.
B = Bandwidth of DEMS channel (in KHz).
F = Absolute value of the difference between the center frequency of the 4 KHz band measured and the center frequency of the DEMS channel (in KHz).
N = Number of active subchannels of the given polarization within the DEMS channel.